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generation (viz., A, B, and C) are as follows:

$$\begin{array}{ll} Z_1 = 0, & Z_4 = 25, \\ Z_2 = 25, & Z_5 = 34.37, \\ Z_3 = 25, & Z_{T_5} = 27.1, \end{array}$$

i.e., in five generations of ancestry the inbreeding is about a quarter of the possible maximum.

There is no deleterious effect of inbreeding apparent in this pedigree. The three children in the last generation, the most inbred of any, show no signs of abnormality. In their father's fraternity, for which $Z_1 = Z_2 = Z_3 = 0$; $Z_4 = 12.5$; $Z_{T_4} = 4.1$, or in four generations of ancestry there is 1/25 of the possible maximum inbreeding, one of eight died of tuberculosis; the other seven have attained adult age. In the mother's fraternity, for which $Z_1 = Z_2 = Z_3 = 0$; $Z_4 = 6.25$; $Z_{T_4} = 2.0$, two out of the three have died of tuberculosis. The least inbred, therefore, show the greatest susceptibility to tuberculosis. The numbers are, of course, too small to draw any certain inference, but so far as they go, they accord best with the view that there is no harmful effect of inbreeding per se.

JOHN RICE MINER

ON COLOR VARIATIONS IN CHITONS

THE question was raised by Bateson ("Materials," 1894, p. 307) as to whether variation occurring in serial parts whose repetition is not strictly speaking of a metameric sort, would be found to simultaneously affect each of the parts involved in such a series. With this point in mind he examined a collection of chitons, the 8 shell plates of these animals providing an excellent opportunity for such observations. He found color variations affecting all the plates of an individual to be of rather rare occurrence, but that plates 2, 4 and 7 seemed, on the other hand, to exhibit a decided tendency to vary together (in several species of *Chiton*).

Although the problem of metamerism, so far as it concerns variation, has perhaps lost some of its original attractiveness, I have thought it worth while to point out that in *Chætopleura* several curious types of shell variation are apparent, involving either simultaneous variation throughout the series or variation in a single shell-valve alone, or both.

The commonest type of color pattern, in *Chætopieura apiculata*, is one which involves a double band of blackish or grayish pigment running the length of valves 2 to 8, the bands joined on 2 and on 8 by continuous semicircular blotches (cf. Fig. 1, *d*).

In 3 out of 219 specimens, however, a central dark stripe, clearly marked on valves 2 to 8 inclusive, accompanied a much fainter double band extending to valve 1 (Fig. 1, *b*), and made up of regular triangular grayish blotches on the posterior borders of valves 2 to 7. In one case, a bright central band of white was marked by a median grayish blotch on valves 3 to 7 (Fig. 1, *a*); a paler example of the same kind is shown in Fig. 1, *e*.

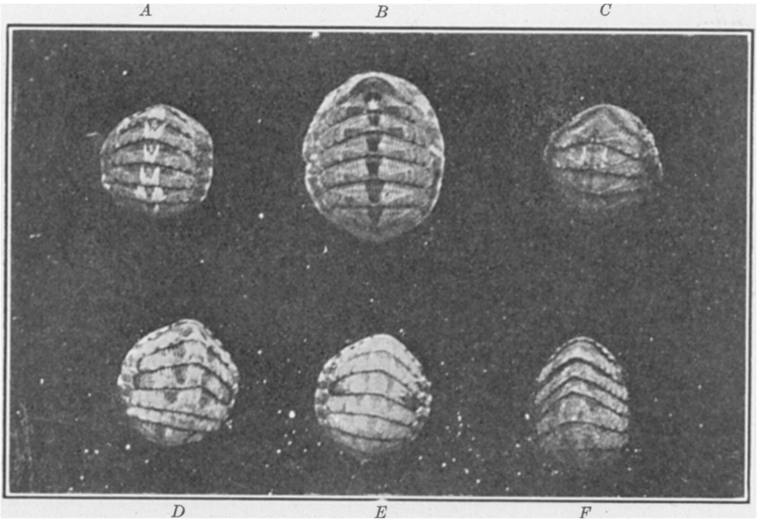

FIG. 1. *Chaetopleura apiculata* (× 2).

These are instances where variation from the more usual color type clearly has taken place simultaneously in the whole series of valve-plates, this condition being seen not only in the form of the central stripe, but also in the shapes of the individual pigment blotches comprised in the double band (cf. Fig. 1, *a* and *b*), as well as in a few cases where three small but distinct pigment flecks were noted on the lateral field of each plate.

In addition, however, two sorts of pattern variation occur which are quite different from the foregoing. In three instances a definite yellow or orange central blotch appeared on valve 2, and nowhere else (Fig. 1, *e*). And in five further instances there was found a marked blackish blotch at either lateral margin of valve

4 (Fig. 1, *d, e*). In two further cases, this type of lateral marking was continued in the form of less distinct marginal blotches on valve 3. The marginal blotches on valve 4 may accompany an otherwise "normal" pigment pattern (10 examples in 219 examined; Fig. 1, *d*), or may be present where there is evidence of a tendency for the formation of a distinct axial stripe (five examples; Fig. 1, *e*).

It is evident, then, that in Chitons color pattern variations may occur in such a way as to affect single valves only (and, in *Chætopleura*, specifically valve 2 or 4); and either quite independently of this type of variation or accompanying it, may also affect all valves in the series simultaneously. Such variations are quite independent of age.

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FUGITIVE NET-VEINING IN THE CICADA (HEMIPTERA)

Tillyard has lately noted [1] that, besides the chitinized veins which serve for the support of the insect wing, there exist in some cases at least fugitive blood-veins during the expansion of the wing, which later collapse and more or less completely disappear when the wing dries. In the Lepidoptera 1st A and the base of M are veins of the same character, and possess tracheæ like other longitudinal veins in that order. In every particular except the absence of chitinization these appear to be true veins, and in forms where the veins are provided with special series of setæ, as in Acræa, they are often similarly supplied.

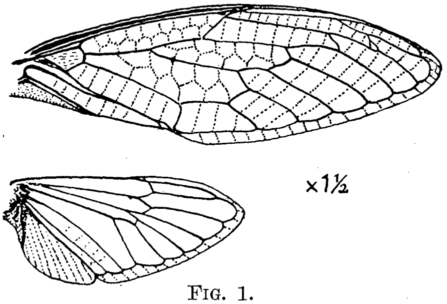

Fig. 1.

In watching a cicada expand, recently, I saw appear, as the

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[1] *Proc. Linn. Soc.*, New S. Wales, 44, 621; 1919.